

# **EFFECT OF PFD TEMPLATES ON ORBITAL SEPARATION IN THE 8025-8400 MHz BAND**

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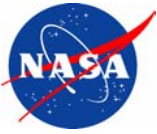




# Outline



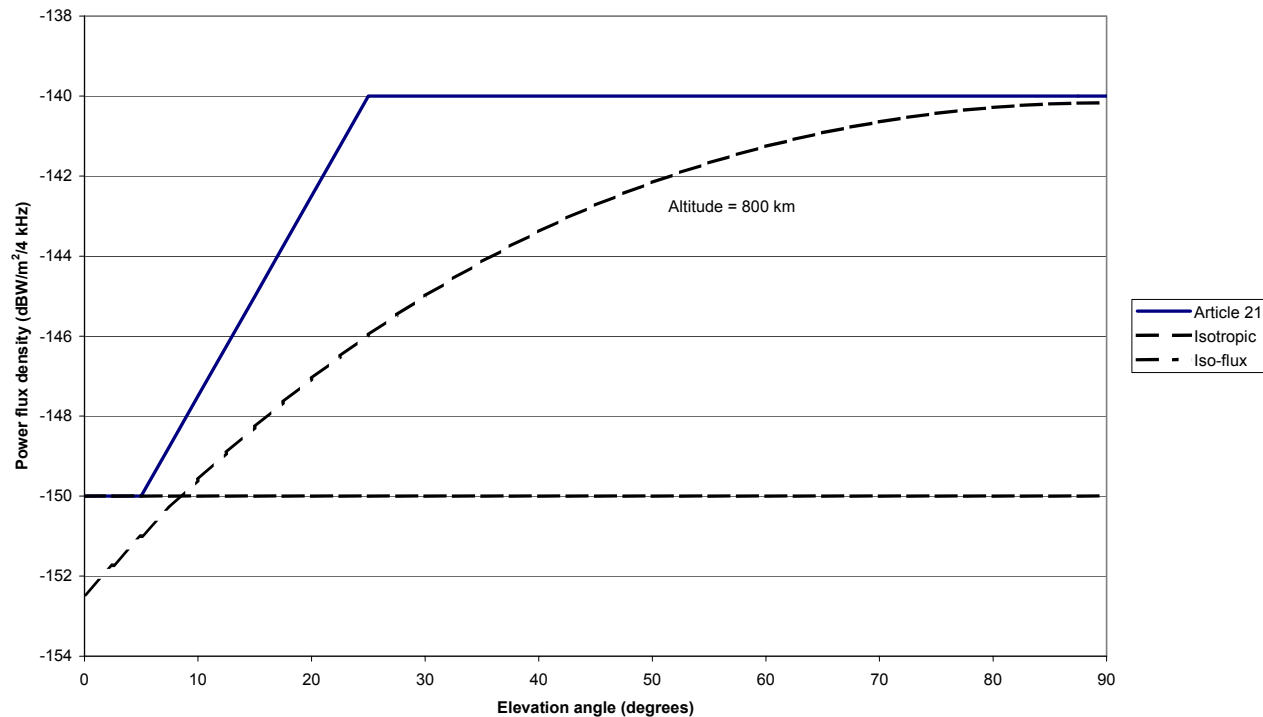
- ☐ **Purpose**
- ☐ **Assumptions**
- ☐ **Results**
- ☐ **Conclusions**



# Purpose



- ❑ To evaluate the relative advantages of Article 21 and iso-flux pfd templates on orbital spacing.



- ❑ The earth station is assumed to use a high-gain receiving antenna with  $D/\lambda \geq 100$ . For off-axis angles between 1 degree and 180 degrees, the gain of the earth station receiving antenna is given in Recommendation ITU-R SA.509 by

$$G(\theta) = 32 - 25 \log(\theta), \text{ dBi} \quad 1^\circ \leq \theta \leq 48^\circ$$

$$G(\theta) = -10, \text{ dBi} \quad \theta > 48^\circ$$

- ❑ The interference is given by

$$I = \rho A_{\text{iso}} G(\theta)$$

$$\theta = \delta_i - \delta_0$$

- ❑ Interference criterion is  $-201 \text{ dBW/Hz}$  (equivalent to  $-165 \text{ dBW/4 kHz}$ )

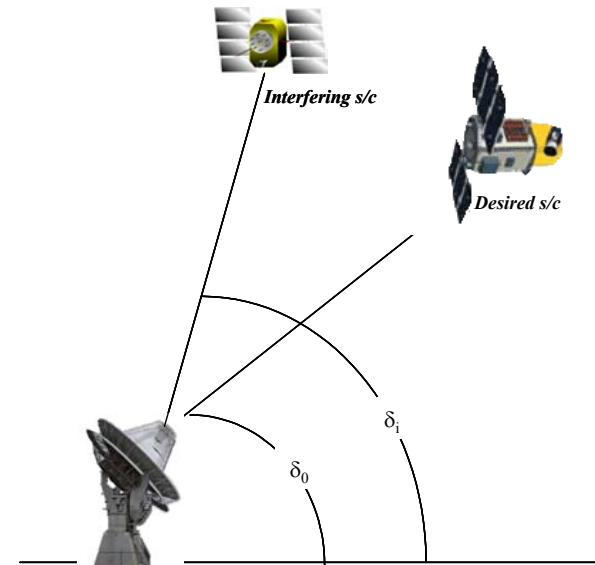


Figure 1 – Geometry of the interference scenario.



# Results

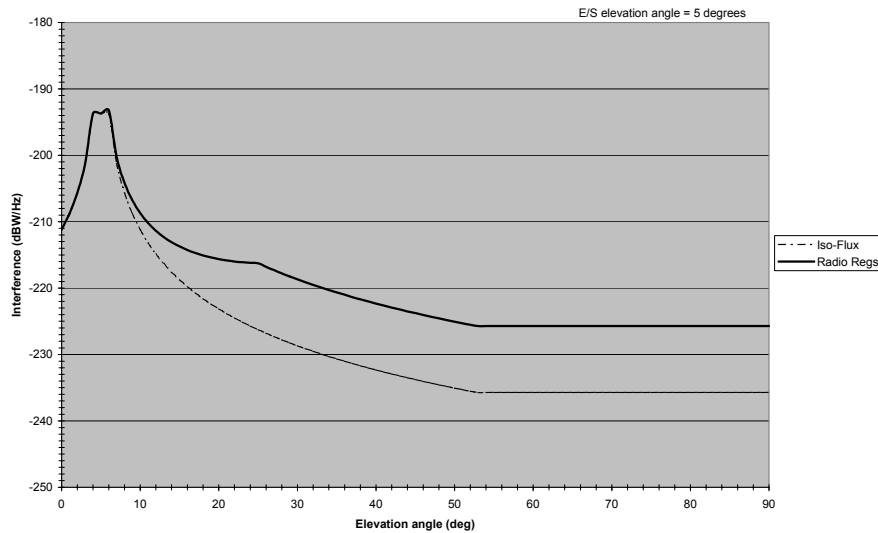


Figure 2 –Interference received by an earth station from the emissions of an NGSO satellite complying with an Article 21 pfd template or an iso-flux pfd template: earth station elevation angle = 5 degrees.

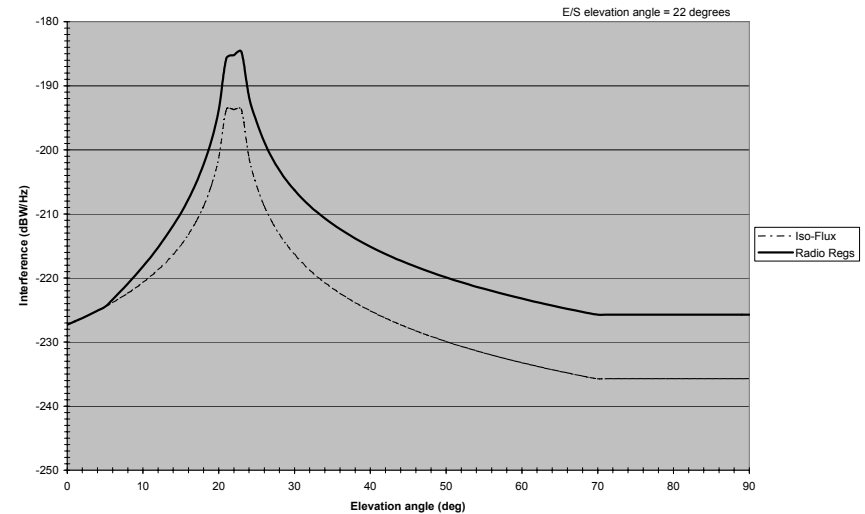


Figure 3 –Interference received by an earth station from the emissions of an NGSO satellite complying with an Article 21 pfd template or an iso-flux pfd template: earth station elevation angle = 22 degrees.



## Results (cont.)

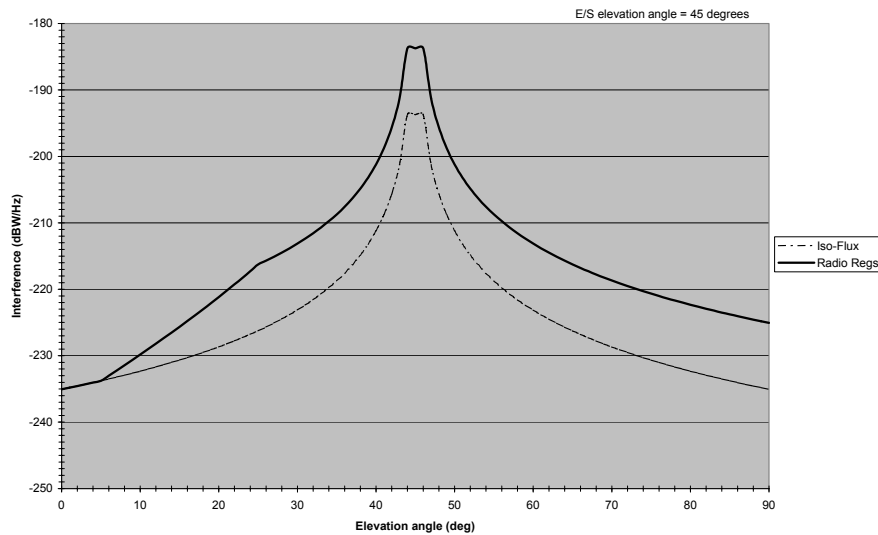
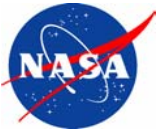


Figure 4 –Interference received by an earth station from the emissions of an NGSO satellite complying with an Article 21 pfd template or an iso-flux pfd template: earth station elevation angle = 45 degrees.

Table 2 – Off-axis angle to satisfy the interference criterion using the Article 21 pfd template and the iso-flux template.

Elevation angle (degrees)	Off-axis angle Article 21 template (degrees)	Off-axis angle Iso-flux template (degrees)
5	4.0	3.75
22	8.5	3.75
45	9.75	3.75



# Conclusions



- ☐ The off-axis angle and severity of an interference event will, for elevation angles greater than 5 degrees, be less when using an iso-flux template than when using a template based on the pfd limits in Article 21 of the Radio Regulations.
- ☐ At elevation angles above about 22 degrees, an iso-flux template will result in a 10 dB reduction in the severity of an interference event and a reduction in the off-axis angle from about 8.5 degrees to 3.75 degrees.
- ☐ At an elevation angle of 45 degrees, the off-axis angle is reduced from 9.75 degrees to 3.75 degrees – a factor of 2.6.